

Detergents comprising amylase and bleach activating
transition metal compound

The present invention relates to enzyme containing
5 detergents comprising besides customary constituents an
amylase from *Bacillus amyloliquefaciens* and certain
active bleach activating substances.

Laundry detergents, in addition to the ingredients
10 vital to the laundering process, such as surfactants
and builder materials, generally comprise further
constituents, which may be grouped together under the
heading of wash auxiliaries and which embrace such
different active substance groups as foam regulators,
15 graying inhibitors, bleaches, bleach activators, and
color transfer inhibitors. Such auxiliaries also
include substances which assist the surfactant
performance by means of enzymatic degradation of stains
present on the textile. The same applies, mutatis
20 mutandis, to cleaning products for hard surfaces. As
well as the proteases, which assist in removing
proteins, and the fat-cleaving lipases, particular
importance in this context attaches to the amylases.
Amylases have the function of facilitating the removal
25 of starchy stains by means of catalytic hydrolysis of
the starch polysaccharide, and have been used for this
purpose for a fairly long time in dishwashing
detergents, but also in detergents for use in textile
laundering. In by far the great majority of cases the
30 amylase involved has comprised a heat-stable amylase
from *Bacillus licheniformis*, which is customary in
commerce under the designation Termamyl®, for example.
More recently, there has been increased use in such
compositions of genetically manipulated amylases; that
35 is, amylases whose amino acid sequence has been
altered, using gene technology methods, in comparison
to naturally occurring amylases. As well as increasing
their capacity to perform, the objective of genetically
modifying amylases is essentially to enhance the

stability of the enzyme, especially their stability to attack by oxidizing agents. One approach toward achieving this objective, which was proposed in International Patent Application WO 94/18314, consists
5 in removing particularly oxidation-susceptible amino acids, such as methionine, tryptophan, cysteine or tyrosine, from the amino acid sequence of the amylase, or replacing them by other amino acids more stable to oxidation. A similar approach is proposed in
10 International Patent Application WO 95/21247, which recommends replacing at least one methionine in the amylase amino acid sequence by an amino acid which is neither methionine nor cysteine.
15 Although such genetic modifications may lead to improved amylase stability under certain application conditions, they do not help to increase the contribution of the amylase to the wash or cleaning performance of corresponding compositions comprising
20 the amylase.

It has surprisingly now been found that the combination of a naturally occurring α -amylase with certain bleach activating substances leads to unexpectedly synergistic
25 performance improvements when used in detergents.

The invention accordingly provides an amylase containing detergent which comprises α -amylase from *Bacillus amyloliquefaciens* and a bleach boosting
30 transition metal complex compound, as well as customary ingredients compatible with such constituents.

The invention further provides for the use of such a combination for enhancing the cleaning performance of
35 detergents, especially with respect to starchy and/or colored stains, especially tea based stains, when used in detergent solutions, especially aqueous detergent solutions, which comprise a peroxygen compound. In this context, cleaning performance with respect to colored

stains is to be understood in its widest context and embraces not only the bleaching of soil present on the textile and the bleaching of soil which is in the wash liquor, having become detached from the textile, but
5 also the oxidative destruction of textile colors present in the wash liquor, having become detached from textiles under the wash conditions, before they are able to attach to different-colored textiles. Also, in the context of use in cleaning solutions for hard
10 surfaces, this term refers both to the bleaching of soil present on the hard surface, especially tea, and to the bleaching of soil which is present in the dishwashing liquor, having become detached from the hard surface.

15 α-Amylase from *Bacillus amyloliquefaciens* has been known for a long time, for example, from the U.S. Patent US 1 227 374. It is available commercially, for example, under the designation Amylase BAN®.

20 A composition of the invention contains preferably from 0.001 mg to 0.5 mg, in particular from 0.02 mg to 0.3 mg, of amyloytic protein per gram of the overall composition. The protein concentration may be
25 determined using known methods, such as the bicinchoninic acid technique (BCA technique, Pierce Chemical Co., Rockford, IL) or the Biuret technique (A.G. Gornall, C.S. Bardawill and M.M. David, J. Biol. Chem. 177, 751-766, 1948).

30 The bleach boosting transition metal complex compound is selected preferably from the complex compounds of Mn, Fe, Co, Cu, Mo, V, Ti or Ru or mixtures thereof. The bleach boosting transition metal complex compounds
35 in question include in particular the manganese, iron, cobalt, ruthenium or molybdenum salen complexes known from International Patent Application WO 97/07192 and their N-analog compounds known from International Patent Application WO 97/44430, the manganese, iron,

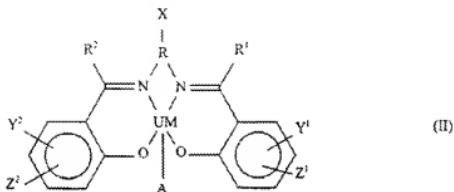
cobalt, ruthenium or molybdenum carbonyl complexes known from German Patent Application DE 195 36 082, the manganese, iron, cobalt, ruthenium, molybdenum, titanium, vanadium and copper complexes described in 5 International Patent Application WO 97/30144 with nitrogenous tripod ligands, the cobalt, iron, copper and ruthenium ammine complexes known from International Patent Application WO 97/36988, the complexes described in German Patent Applications DE 197 57 918 and 10 DE 198 09 713 with dendrimer ligands, the manganese, copper and cobalt complexes described in German Patent Application DE 44 16 438, the cobalt complexes described in European Patent Application EP 0 272 030, the manganese complexes known from European Patent 15 Application EP 0 693 550, the manganese, iron, cobalt and copper complexes known from European Patent EP 0 392 592, the cobalt complexes known from International Patent Applications WO 96/23859, WO 96/23860 and WO 96/23861, and/or the manganese 20 complexes described in European Patent EP 0 443 651 or in European Patent Applications EP 458 397, EP 0 458 398, EP 0 549 271, EP 0 549 272, EP 0 544 490 and EP 0 544 519. Bleach activating transition metal complex compounds are used preferably in an amount of 25 up to 1% by weight, in particular from 0.001% by weight to 0.25% by weight, and with particular preference from 0.015% by weight to 0.1% by weight, based in each case on transition metal, in compositions of the invention.

The bleach boosting transition metal complex 30 compound is preferably selected from the compounds of the general formula I



where M is a transition metal selected from cobalt, iron, copper and ruthenium, L is a ligand attached by 35 way of one coordination site and L^2 is a ligand attached by way of two coordination sites, x is a number from 0 to 5, y is a number from 0 to 2, with the proviso that $x + 2y$ is not more than 5, A is a salt-forming anion, and n is a number of a size such that

the compound of formula (I) has no charge, or from complex compounds of the general formula (II)



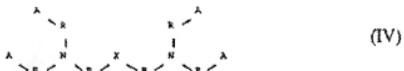
5 where

	UM	represents manganese, iron, cobalt, ruthenium or molybdenum,
10	R	represents an alkylene, alkenylene, phenylene or cycloalkylene radical which in addition to the substituent X may if desired be alkyl- and/or aryl-substituted, having a total of 1 to 12 carbon atoms, the shortest distance within R between the nitrogen atoms which complex with UM being 1 to 5 carbon atoms,
15	X	represents -H, -OR ³ , -NO ₂ , -F, -Cl, -Br or -I,
20	R ¹ , R ² and R ³	independently of one another represent hydrogen or an alkyl radical having 1 to 4 carbon atoms,
25	Y ¹ and Y ²	independently of one another represent hydrogen or an electron displacing substituent, Y ¹ and Y ² not both being hydrogen if R is alkylene or cyclohexylene,
	Z ¹ and Z ²	independently of one another represent hydrogen, -CO ₂ M, -SO ₃ M or -NO ₂ ,
30	M	represents hydrogen or an alkali metal such as lithium, sodium or potassium, and

A represents a charge equalizing anion ligand,
or complexes of the transition metals manganese, iron,
cobalt, ruthenium, molybdenum, titanium, vanadium
5 and/or copper, which possess one or more of the ligands
III



where R is a direct bond or an optionally amino-substituted alkylene group having 1 to 4 carbon atoms,
10 A represents a fused or unfused ring system containing at least one nitrogen atom, and B is hydrogen, an OH group or A, or of the general formula IV



where A and R are as defined for formula III and X is an optionally hydroxyl- and/or C₁₋₄ alkyl-substituted phenylene ring or an optionally hydroxyl-substituted C₁₋₄ alkylene group. In one preferred embodiment of compositions of the invention, the transition metal complex compound has at least one optionally 15 N-alkylated triazacyclononane ligand. A further preferred embodiment of compositions of the invention comprises the bleach boosting transition metal complex compound in the form of an active substance combination 20 which is obtainable by intimately mixing a water soluble salt of a divalent transition metal selected from cobalt, iron, copper and ruthenium and mixtures thereof, a water soluble ammonium salt and, if desired, a peroxygen based oxidizing agent, plus inert carrier material, and which was described in European Patent 25 Application EP 0 832 969.

In addition to the active substance combination used in accordance with the invention, the detergents of the invention, which may be present as solids, especially pulverulent solids, in postcompacted particle form, as 5 homogeneous solutions or suspensions may in principle comprise all known ingredients which are customary in such compositions. The compositions of the invention may in particular comprise builder substances, surface-active surfactants, bleaches based on organic and/or 10 inorganic peroxygen compounds, additional bleach activators, water miscible organic solvents, additional enzymes, sequesterants, electrolytes, pH regulators, and further auxiliaries, such as optical brighteners, 15 graying inhibitors, color transfer inhibitors, foam regulators, silver corrosion inhibitors, and also dyes and fragrances.

The compositions of the invention may comprise a surfactant or two or more surfactants, suitable 20 surfactants comprising in particular anionic surfactants, nonionic surfactants and mixtures thereof, but also cationic, zwitterionic and amphoteric surfactants.

25 Suitable nonionic surfactants are, in particular, alkyl glycosides and ethoxylation and/or propoxylation products of alkyl glycosides or linear or branched alcohols having in each case 12 to 18 carbon atoms in the alkyl moiety and from 3 to 12, preferably from 4 to 30 10, alkyl ether groups. It is also possible to use corresponding ethoxylation and/or propoxylation products of N-alkylamines, vicinal diols, fatty acid esters and fatty acid amides, which in terms of the alkyl moiety correspond to the aforementioned long 35 chain alcohol derivatives, and also alkylphenols having 5 to 12 carbon atoms in the alkyl radical.

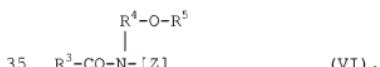
Nonionic surfactants used are preferably alkoxylated, advantageously ethoxylated, especially primary,

alcohols having preferably 8 to 18 carbon atoms and on average from 1 to 12 mol of ethylene oxide (EO) per mole of alcohol, in which the alcohol radical may be linear or, preferably, methyl-branched in position 2 and/or may comprise linear and methyl-branched radicals in a mixture, as are commonly present in oxo alcohol radicals. In particular, however, preference is given to alcohol ethoxylates containing linear radicals from alcohols of natural origin having 12 to 18 carbon atoms, e.g., from coconut, palm, tallow fatty or oleyl alcohol and on average from 2 to 8 EO per mole of alcohol. Preferred ethoxylated alcohols include, for example, C₁₂₋₁₄ alcohols containing 3 EO or 4 EO, C₉₋₁₁ alcohols containing 7 EO, C₁₃₋₁₅ alcohols containing 3 EO, 5 EO, 7 EO or 8 EO, C₁₂₋₁₈ alcohols containing 3 EO, 5 EO or 7 EO, and mixtures thereof, such as mixtures of C₁₂₋₁₄ alcohol containing 3 EO and C₁₂₋₁₈ alcohol containing 7 EO. The stated degrees of ethoxylation represent statistical mean values, which for a specific product may be an integer or a fraction. Preferred alcohol ethoxylates have a narrowed homolog distribution (narrow range ethoxylates, NREs). In addition to these nonionic surfactants it is also possible to use fatty alcohols containing more than 12 EO. Examples thereof are (tallow) fatty alcohols containing 14 EO, 16 EO, 20 EO, 25 EO, 30 EO or 40 EO. Especially in detergents for use in machine dishwashing processes, it is common to use extremely low-foaming compounds. These include, preferably, C_{12-C₁₈} alkyl polyethylene glycol-polypropylene glycol ethers having in each case up to 8 mol of ethylene oxide and propylene oxide units in the molecule. However, it is also possible to use other nonionic surfactants which are known to be low-foaming, such as, for example, C_{12-C₁₈} alkyl polyethylene glycol-polybutylene glycol ethers having in each case up to 8 mol of ethylene oxide and butylene oxide units in the molecule, and also endgroup-capped alkyl polyalkylene glycol mixed ethers. Particular preference is also given to the hydroxyl-

containing alkoxylated alcohols as are described in European Patent Application EP 0 300 305, referred to as hydroxy mixed ethers. The nonionic surfactants also include alkyl glycosides of the general formula $RO(G)_x$,
5 where R is a primary straight-chain or methyl-branched aliphatic radical, especially an aliphatic radical methyl-branched in position 2, containing 8 to 22, preferably 12 to 18, carbon atoms, and G represents a glycoside unit having 5 or 6 carbon atoms, preferably
10 glucose. The degree of oligomerization, x, which indicates the distribution of monoglycosides and oligoglycosides, is any desired number - which, as a variable to be determined analytically, may also be a fraction - between 1 and 10; preferably, x is from 1.2
15 to 1.4. Further suitable surfactants are polyhydroxy fatty acid amides of the formula (V)



where R^1CO is an aliphatic acyl radical having 6 to 22 carbon atoms, R^2 is hydrogen or an alkyl or hydroxyalkyl radical having 1 to 4 carbon atoms, and
25 [Z] is a linear or branched polyhydroxyalkyl radical having 3 to 10 carbon atoms and from 3 to 10 hydroxyl groups. The polyhydroxy fatty acid amides are derived preferably from reducing sugars having 5 or 6 carbon atoms, especially glucose. The group of the polyhydroxy
30 fatty acid amides also includes compounds of the formula (VI)



where R^3 is a linear or branched alkyl or alkenyl radical having 7 to 12 carbon atoms, R^4 is a linear, branched or cyclic alkylene radical or an arylene radical having 2 to 8 carbon atoms and R^5 is a linear,
40

branched or cyclic alkyl radical or an aryl radical or an oxyalkyl radical having 1 to 8 carbon atoms, preference being given to C₁-C₄ alkyl radicals or phenyl radicals, and [Z] is a linear polyhydroxyalkyl radical
5 whose alkyl chain is substituted by at least two hydroxyl groups, or alkoxylated, preferably ethoxylated or propoxylated, derivatives of said radical. Here too, [Z] is preferably obtained by reductive amination of a sugar such as glucose, fructose, maltose, lactose,
10 galactose, mannose, or xylose. The N-alkoxy- or N-aryloxy-substituted compounds may then be converted to the desired polyhydroxy fatty acid amides, for example, in accordance with the teaching of International Patent Application WO 95/07331 by
15 reaction with fatty acid methyl esters in the presence of an alkoxide as catalyst. A further class of nonionic surfactants used with preference, which are used either as sole nonionic surfactant or in combination with other nonionic surfactants, in particular together with
20 alkoxylated fatty alcohols and/or alkyl glycosides, are alkoxylated, preferably ethoxylated, or ethoxylated and propoxylated, fatty acid alkyl esters, preferably having 1 to 4 carbon atoms in the alkyl chain, especially fatty acid methyl esters, as are described,
25 for example, in Japanese Patent Application JP 58/217598, or those prepared preferably by the process described in International Patent Application WO 90/13533. Nonionic surfactants of the amine oxide type, examples being N-cocoalkyl-N,N-dimethylamine
30 oxide and N-tallowalkyl-N,N-dihydroxyethylamine oxide, and of the fatty acid alkanolamide type, may also be suitable. The amount of these nonionic surfactants is preferably not more than that of the ethoxylated fatty alcohols, in particular not more than half thereof.
35 Further suitable surfactants include those known as gemini surfactants. This term is used generally to refer to those compounds which possess two hydrophilic groups per molecule. These groups are generally separated from one another as a result of what is known

as a spacer. This spacer is generally a carbon chain, which should be long enough to give the hydrophilic groups a sufficient spacing to allow them to act independently of one another. Surfactants of this kind
5 are generally notable for an unusually low critical micelle concentration and the ability to reduce greatly the surface tension of water. In exceptional cases, however, the expression gemini surfactants is used to embrace not only dimeric but also, correspondingly,
10 trimeric surfactants. Examples of suitable gemini surfactants are sulfated hydroxy mixed ethers in accordance with German Patent Application DE 43 21 022 or dimer alcohol bis- and trimer alcohol tri-sulfates and ether sulfates in accordance with German Patent
15 Application DE 195 03 061. Endgroup-capped dimeric and trimeric mixed ethers in accordance with German Patent Application DE-A-195 13 391 are notable in particular for their bi- and multifunctionality. Thus said endgroup-capped surfactants possess good wetting
20 properties and are low-foaming, so making them particularly suitable for use in machine washing or cleaning processes. However, it is also possible to use gemini-polyhydroxy fatty acid amides or polypolyhydroxy fatty acid amides, as described in International Patent
25 Applications WO 95/19953, WO 95/19954, and WO 95/19955.

Suitable anionic surfactants are, in particular, soaps and those containing sulfate or sulfonate groups. Preferred surfactants of the sulfonate type are C₉₋₁₃
30 alkylbenzenesulfonates, olefinsulfonates, i.e., mixtures of alkenesulfonates and hydroxyalkane-sulfonates, and also disulfonates, as are obtained, for example, from C₁₂₋₁₈ monoolefins having a terminal or internal double bond by sulfonating with gaseous sulfur
35 trioxide followed by alkaline or acidic hydrolysis of the sulfonation products. Also suitable are alkanesulfonates, which are obtained from C₁₂₋₁₈ alkanes, for example, by sulfochlorination or sulfoxidation with subsequent hydrolysis or neutralization, respectively.

Likewise suitable, in addition, are the esters of α -sulfo fatty acids (ester sulfonates), e.g., the α -sulfonated methyl esters of hydrogenated coconut, palm kernel or tallow fatty acids, which are prepared
5 by α -sulfonylation of the methyl esters of fatty acids of plant and/or animal origin having 8 to 20 carbon atoms in the fatty acid molecule, followed by neutralization to give water-soluble mono-salts. Preferably, these comprise the α -sulfonated esters of hydrogenated
10 coconut, palm, palm kernel or tallow fatty acids, it being possible as well for sulfonation products of unsaturated fatty acids, e.g. oleic acid, to be present in small amounts, preferably in amounts of not more than about 2 to 3% by weight. Particular preference is
15 given to α -sulfo fatty acid alkyl esters having an alkyl chain of not more than 4 carbon atoms in the ester group, examples being methyl esters, ethyl esters, propyl esters, and butyl esters. With particular advantage, the methyl esters of the α -sulfo
20 fatty acids (MES) are used, and also their saponified di-salts. Further suitable anionic surfactants are sulfated fatty acid glycerol esters which are the monoesters, diesters and triesters, and mixtures thereof, as obtained in the preparation by
25 esterification of a monoglycerol with from 1 to 3 mol of fatty acid or in the transesterification of triglycerides with from 0.3 to 2 mol of glycerol. Preferred alk(en)yl sulfates are the alkali metal salts, and especially the sodium salts, of the sulfuric
30 monoesters of C₁₂-C₁₈ fatty alcohols, examples being those of coconut fatty alcohol, tallow fatty alcohol, lauryl, myristyl, cetyl or stearyl alcohol, or of C₁₀-C₂₀ oxo alcohols, and those monoesters of secondary alcohols of this chain length. Preference is also given
35 to alk(en)yl sulfates of said chain length which contain a synthetic straight-chain alkyl radical prepared on a petrochemical basis, these sulfates possessing degradation properties similar to those of the corresponding compounds based on fatty-chemical raw

materials. From a detergents standpoint, C₁₂-C₁₆ alkyl sulfates and C₁₂-C₁₅ alkyl sulfates, and also C₁₄-C₁₅ alkyl sulfates, are particularly preferred. In addition, 2,3-alkyl sulfates, which may for example be prepared in accordance with US Patents 3,234,258 or 5,075,041 and obtained as commercial products from Shell Oil Company under the name DAN®, are suitable anionic surfactants. Also suitable are the sulfuric monoesters of the straight-chain or branched C₇₋₂₁ alcohols ethoxylated with from 1 to 6 mol of ethylene oxide, such as 2-methyl-branched C₉₋₁₁ alcohols containing on average 3.5 mol of ethylene oxide (EO) or C₁₂₋₁₈ fatty alcohols containing from 1 to 4 EO. Preferred anionic surfactants further include the salts of alkylsulfosuccinic acid, which are also referred to as sulfosuccinates or as sulfosuccinic esters and which constitute the monoesters and/or diesters of sulfosuccinic acid with alcohols, preferably fatty alcohols and especially ethoxylated fatty alcohols. Preferred sulfosuccinates comprise C₈₋₁₈ fatty alcohol radicals or mixtures thereof. Especially preferred sulfosuccinates contain a fatty alcohol radical derived from ethoxylated fatty alcohols which themselves represent nonionic surfactants. Particular preference is given in turn to sulfosuccinates whose fatty alcohol radicals are derived from ethoxylated fatty alcohols having a narrowed homolog distribution. Similarly, it is also possible to use alk(en)ylsuccinic acid containing preferably 8 to 18 carbon atoms in the alk(en)yl chain, or salts thereof. Further suitable anionic surfactants include fatty acid derivatives of amino acids, for example, of N-methyltaurine (taurides) and/or of N-methylglycine (sarcosides). Particular preference is given here to sarcosides and to the sarcosinates and, of these, especially the sarcosinates of higher fatty acids, which may be mono- or polyunsaturated, such as oleyl sarcosinate. Further suitable anionic surfactants are, in particular, soaps. Suitable soaps include in particular saturated fatty

acid soaps, such as the salts of lauric acid, myristic acid, palmitic acid, stearic acid, hydrogenated erucic acid and behenic acid, and, in particular, mixtures of soaps derived from natural fatty acids, e.g., coconut, 5 palm kernel, or tallow fatty acids. Together with these soaps, or as substitutes for soaps, it is also possible to use the known alkenylsuccinic salts.

The anionic surfactants, including the soaps, may be 10 present in the form of their sodium, potassium or ammonium salts and also as soluble salts of organic bases, such as mono-, di- or triethanolamine. Preferably, the anionic surfactants are in the form of their sodium or potassium salts, in particular in the 15 form of the sodium salts.

In laundry detergents of the invention, surfactants are 20 present in proportions of preferably from 5% by weight to 50% by weight, in particular from 8% by weight to 30% by weight, whereas compositions for cleaning hard surfaces, especially for the machine cleaning of kitchen- and tableware, have lower surfactant contents of up to 10% by weight, in particular up to 5% by weight, and preferably in the range from 0.5% by weight 25 to 3% by weight.

A composition of the invention comprises preferably at 30 least one water soluble and/or water insoluble, organic and/or inorganic builder. The water soluble organic builder substances include polycarboxylic acids, especially citric acid and sugar acids, monomeric and polymeric amino polycarboxylic acids, in particular methylglycinediacetic acid, nitrilotriacetic acid and ethylenediaminetetraacetic acid, and also polyaspartic acid, polyphosphonic acids, especially aminotris-(methylenephosphonic acid), ethylenediaminetetrakis-(methylenephosphonic acid) and 1-hydroxyethane-1,1-diphosphonic acid, polymeric hydroxy compounds such as 35 dextrin, and also polymeric (poly)carboxylic acids,

especially the polycarboxylates of European Patent EP 0 625 992 or of International Patent Application WO 92/18542 or of European Patent EP 0 232 202, which are obtainable by oxidizing polysaccharides or,
5 respectively, dextrans; polymeric acrylic acids, methacrylic acids, maleic acids and copolymers thereof, which may also contain in copolymerized form small fractions of polymerizable substances without carboxylic acid functionality. The relative molecular
10 mass of the homopolymers of unsaturated carboxyclic acids is generally between 3000 and 200,000, that of the copolymers between 2000 and 200,000, preferably from 30,000 to 120,000, based in each case on free acid. A particularly preferred acrylic acid-maleic acid
15 copolymer has a relative molecular mass of from 30,000 to 100,000. Commercially customary products are, for example, Sokalan® CP 5, CP 10 and PA 30 from BASF. Suitable though less preferred compounds of this class are copolymers of acrylic acid or methacrylic acid with
20 vinyl ethers, such as vinyl methyl ethers, vinyl esters, ethylene, propylene and styrene, in which the acid fraction is at least 50% by weight. As water soluble organic builder substances it is also possible to use terpolymers containing as monomers two
25 unsaturated acids and/or their salts and, as the third monomer, vinyl alcohol and/or an esterified vinyl alcohol or a carbohydrate. The first acidic monomer or salt thereof is derived from a monoethylenically unsaturated C₃-C₈ carboxylic acid and, preferably, from
30 a C₃-C₄ monocarboxylic acid, especially from (meth)acrylic acid. The second acidic monomer or salt thereof may be a derivative of a C₄-C₈ dicarboxylic acid, maleic acid being particularly preferred, and/or a derivative of an allylsulfonic acid substituted in
35 position 2 by an alkyl or aryl radical. Such polymers may be prepared in particular by processes which are described in German Patent DE 42 21 381 and German Patent Application DE 43 00 772, and generally have a relative molecular mass of between 1000 and 200,000.

Further preferred copolymers are those described in German Patent Applications DE 43 03 320 and DE 44 17 734, containing as monomers preferably acrolein and acrylic acid/acrylic acid salts, and/or 5 vinyl acetate. The organic builder substances, especially for the preparation of liquid compositions, may be used in the form of aqueous solutions, preferably aqueous solutions with a strength of from 30 to 50 percent by weight. All said acids are generally 10 used in the form of their water soluble salts, especially their alkali metal salts.

Organic builder substances of this kind may be present, if desired, in amounts of up to 40% by weight, in 15 particular up to 25% by weight, and preferably from 1% by weight to 8% by weight. Amounts close to the stated upper limit are used preferably in pastelike or liquid compositions of the invention, especially those containing water.

20 Suitable water soluble inorganic builder materials include, in particular, alkali metal silicates, alkali metal carbonates and alkali metal phosphates, which may be present in the form of their alkaline, neutral or acidic sodium or potassium salts. Examples thereof are trisodium phosphate, tetrasodium diphosphate, disodium dihydrogen diphosphate, pentasodium triphosphate, so-called sodium hexametaphosphate, oligomeric trisodium phosphate having degrees of oligomerization from 5 to 25 1000, especially from 5 to 50, and also the corresponding potassium salts and/or mixtures of sodium and potassium salts. Water insoluble, water dispersible inorganic builder materials used are, in particular, crystalline or amorphous alkali metal aluminosilicates, 30 35 in amounts of up to 50% by weight, preferably not more than 40% by weight, and in liquid compositions in particular from 1% by weight to 5% by weight. Among these, preference is given to the crystalline sodium aluminosilicates of detergent quality, especially zeolite

A, P and, if appropriate, X, alone or in mixtures, in the form for example of a cocrystallize of zeolites A and X (Vegobond® AX, a commercial product from Condea Augusta S.p.A.). Amounts close to the stated upper limit are used preferably in solid, particulate compositions. Suitable aluminosilicates possess in particular no particles having a size of more than 30 µm, and preferably consist at least 80% by weight of particles having a size below 10 µm. Their calcium binding capacity, which may be determined in accordance with the information in German Patent DE 24 12 837, is generally in the range from 100 to 200 mg of CaO per gram.

Suitable substitutes or partial substitutes for said aluminosilicate are crystalline alkali metal silicates, which may be present alone or in a mixture with amorphous silicates. The alkali metal silicates which can be used as builders in the compositions of the invention preferably have a molar ratio of alkali metal oxide to SiO₂ of below 0.95, in particular from 1:1.1 to 1:12, and may be present in amorphous or crystalline form. Preferred alkali metal silicates are the sodium silicates, especially the amorphous sodium silicates, having a molar ratio Na₂O:SiO₂ of from 1:2 to 1:2.8. Those with a molar ratio Na₂O:SiO₂ of from 1:1.9 to 1:2.8 may be prepared by the process of European Patent Application EP 0 425 427. As crystalline silicates which may be present alone or in a mixture with amorphous silicates it is preferred to use crystalline phyllosilicates of the general formula Na₂Si_xO_{2x+1}·yH₂O, where x, the so-called modulus, is a number from 1.9 to 22, in particular from 1.9 to 4, and y is a number from 0 to 33, and preferred values for x are 2, 3 or 4. Crystalline phyllosilicates which fall under this general formula are described, for example, in European Patent Application EP 0 164 514. Preferred crystalline phyllosilicates are those where x in the stated general formula adopts the values 2 or 3. In particular, both

β - and δ -sodium disilicates ($\text{Na}_2\text{Si}_2\text{O}_5 \cdot y\text{H}_2\text{O}$) are preferred, with β -sodium disilicate, for example, being obtainable by the process described in International Patent Application WO 91/08171. δ -Sodium silicates having a modulus of between 1.9 and 3.2 may be prepared in accordance with Japanese Patent Applications JP 04/238 809 and JP 04/260 610. In addition, virtually anhydrous crystalline alkali metal silicates of the abovementioned general formula wherein x is a number from 1.9 to 2.1, prepared from amorphous alkali metal silicates, and preparable as described in European Patent Applications EP 0 548 599, EP 0 502 325 and EP 0 452 428, may be used in compositions of the invention. In a further preferred embodiment of compositions of the invention, a crystalline sodium phyllosilicate having a modulus of from 2 to 3 is used, as may be prepared from sand and soda by the process of European Patent Application EP 0 436 835. Crystalline sodium silicates having a modulus in the range from 1.9 to 3.5, as are obtainable by the processes of European Patents EP 0 164 552 and/or EP 0 294 753, are used in a further preferred embodiment of compositions of the invention. Crystalline sheetlike silicates of the abovementioned formula are sold by Clariant GmbH under the trade name Na-SKS, e.g., Na-SKS-1 ($\text{Na}_2\text{Si}_{22}\text{O}_{45} \cdot x\text{H}_2\text{O}$, kanyaite), Na-SKS-2 ($\text{Na}_2\text{Si}_{14}\text{O}_{29} \cdot x\text{H}_2\text{O}$, magadiite), Na-SKS-3 ($\text{Na}_2\text{Si}_8\text{O}_{17} \cdot x\text{H}_2\text{O}$) or Na-SKS-4 ($\text{Na}_2\text{Si}_4\text{O}_9 \cdot x\text{H}_2\text{O}$, makatite). Of these, those particularly suitable include Na-SKS-5 ($\alpha\text{-Na}_2\text{Si}_2\text{O}_5$), Na-SKS-7 ($\beta\text{-Na}_2\text{Si}_2\text{O}_5$, natrosilite), Na-SKS-9 ($\text{NaHSi}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$), Na-SKS-10 ($\text{NaHSi}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$, kanemite), Na-SKS-11 ($t\text{-Na}_2\text{Si}_2\text{O}_5$) and Na-SKS-13 (NaHSi_2O_5), but especially Na-SKS-6 ($\delta\text{-Na}_2\text{Si}_2\text{O}_5$). A review of crystalline phyllosilicates is given, for example, by the articles published in "Hoechst High Chem Magazin 14/1993" on pages 33-38 and in Seifen-Öle-Fette-Wachse, Vol. 116, No. 20/1990 on pages 805-808. In one preferred embodiment of compositions of the invention, use is made of a granular compound of crystalline phyllosilicate and citrate, of crystalline phyllo-

silicate and abovementioned (co)polymeric polycarboxylic acid, as is described, for example, in German Patent Application DE 198 19 187, or of alkali metal silicate and alkali metal carbonate, as is described, for example, in International Patent Application WO 95/22592 or as is available commercially, for example, under the name Nabion® 15.

Builder substances may be present in the compositions of the invention, if desired, in amounts of up to 90% by weight. They are preferably present in amounts of up to 75% by weight. Laundry detergents of the invention have builder contents of in particular from 5% by weight to 50% by weight. In compositions of the invention for cleaning hard surfaces, especially for the machine cleaning of kitchen- and tableware, the amount of builder substances is in particular from 5% by weight to 88% by weight, preferably no water insoluble builder materials being used in such compositions. In a preferred embodiment of compositions of the invention intended in particular for the machine washing of kitchen- and tableware, from 20% by weight to 40% by weight of water soluble organic builder, especially alkali metal citrate, from 5% by weight to 15% by weight of alkali metal carbonate, and from 20% by weight to 40% by weight of alkali metal disilicate are present.

Peroxygen compounds suitable for use in compositions of the invention include, in particular, organic peracids or peracidic salts of organic acids, such as phthalimidopercaproic acid, perbenzoic acid or salts of diperdodecanedioic acid, hydrogen peroxide, and inorganic salts which give off hydrogen peroxide under the washing conditions, including perborate, percarbonate, persilicate and/or persulfate such as Caroate. Where solid peroxygen compounds are to be used, they may be employed in the form of powders or granules, which may also have been coated in a manner

which is known in principle. Where a composition of the invention does comprise peroxygen compounds, they are present in amounts of preferably up to 50% by weight, in particular from 5% by weight to 30% by weight. The 5 addition of small amounts of known bleach stabilizers such as, for example, of phosphonates, borates and/or metaborates and metasilicates, and also magnesium salts such as magnesium sulfate, may be judicious.

10 In addition to the bleach activating transition metal complex compound, it is possible to use compounds which under perhydrolysis conditions give off peroxyo-carboxylic acid, so-called bleach activators. Combinations of bleach activators and transition metal 15 bleaching catalysts are known, for example, from International Patent Applications WO 97/36987 and WO 95/27775. Bleach activators which may be used are, in particular, compounds which under perhydrolysis conditions give rise to aliphatic peroxy carboxylic acids having preferably 1 to 10 carbon atoms, in particular 2 to 4 carbon atoms, and/or substituted or unsubstituted perbenzoic acid. Suitable substances are those which carry O-acyl and/or N-acyl groups of the stated number of carbon atoms, and/or substituted or 20 unsubstituted benzoyl groups. Preference is given to polyacylated alkylenediamines, especially tetraacetyl-ethylenediamine (TAED), acylated triazine derivatives, especially 1,5-diacetyl-2,4-dioxohexahydro-1,3,5-triazine (DADHT), acylated glycolurils, especially 25 tetraacetylglycoluril (TAGU), N-acyl imides, especially N-nonanoylsuccinimide (NOSI), acylated phenol-sulfonates, especially n-nonanoyl- or isononanoyloxy-benzenesulfonate (n- or iso-NOBS), carboxylic anhydrides, especially phthalic anhydride, acylated 30 polyhydric alcohols, especially triacetin, ethylene glycol diacetate, 2,5-diacetoxy-2,5-dihydrofuran, and the enol esters known from German Patent Applications DE 196 16 693 and DE 196 16 767, and also acetylated sorbitol and mannitol and/or the mixtures thereof 35

(SORMAN) described in European Patent Application EP 0 525 239, acylated sugar derivatives, especially pentaacetylglucose (PAG), pentaacetylfructose, tetraacetylxylose and octaacetyllactose, and 5 acetylated, optionally N-alkylated glucamine and gluconolactone, and/or N-acylated lactams, for example, N-benzoylcapro lactam, which are known from International Patent Applications WO 94/27970, WO 94/28102, WO 94/28103, WO 95/00626, WO 95/14759 and 10 WO 95/17498. The hydrophilically substituted acylacetals known from German Patent Application DE 196 16 769 and acyllactams described in German Patent Application DE 196 16 770 and in International Patent Application WO 95/14075 are likewise used with 15 preference. The combinations of conventional bleach activators known from German Patent Application DE 44 43 177, may also be used. Such bleach activators may be present in customary quantities, preferably in amounts of from 0.5% by weight to 10% by weight, and in 20 particular from 1% by weight to 8% by weight, based on overall composition. In addition to the conventional bleach activators, or instead of them, it is also possible for the sulfonimines known from European Patents EP 0 446 982 and EP 0 453 003 to be present.

25 Enzymes which may be used in the compositions in addition to the amylase that is essential to the invention include those from the class of the proteases, lipases, cutinases, pullulanases, 30 hemicellulases, cellulases, oxidases, laccases and peroxidases, and mixtures thereof. If desired, amylases other than the amylase essential to the invention may be present in addition to it. Particularly suitable active enzymatic substances are those obtained from 35 fungi or bacteria, such as *Bacillus subtilis*, *Bacillus licheniformis*, *Bacillus latus*, *Streptomyces griseus*, *Humicola lanuginosa*, *Humicola insolens*, *Pseudomonas pseudoalcaligenes*, *Pseudomonas cepacia* or *Coprinus cinereus*. The amylase essential to the invention and

the enzymes that may be used in addition may - as described, for example, in European Patent EP 0 564 476 or in International Patent Application WO 94/23005 - be adsorbed on carrier substances and/or embedded in 5 coating substances in order to protect them against premature inactivation. In the detergents of the invention they are present preferably in amounts of up to 5% by weight, in particular from 0.2% by weight to 4% by weight. Where the composition of the invention 10 comprises protease, it preferably has a proteolytic activity in the range from about 100 PU/g to about 10,000 PU/g, in particular from 300 PU/g to 8000 PU/g. Where two or more enzymes are to be used in the 15 composition of the invention, this may be accomplished by incorporating the two or more separate, or conventionally separately compounded enzymes, or by means of two or more enzymes compounded together in granules, as known, for example, from International Patent Applications WO 96/00772 or WO 96/00773.

20

The organic solvents which may be used besides water in the compositions of the invention, especially if they are present in liquid or paste form, include alcohols having 1 to 4 carbon atoms, especially methanol, 25 ethanol, isopropanol and tert-butanol, diols having 2 to 4 carbon atoms, especially ethylene glycol and propylene glycol, and also mixtures thereof and the ethers derivable from the aforementioned classes of compound. Water miscible solvents of this kind are 30 present in the compositions of the invention preferably in amounts of not more than 30% by weight, in particular from 6% by weight to 20% by weight.

Additionally, the compositions may comprise further 35 constituents customary in detergents. These optional constituents include, in particular, enzyme stabilizers, graying inhibitors, color transfer inhibitors, foam inhibitors, and optical brighteners and also dyes and fragrances. In order to protect

against silver corrosion, silver corrosion inhibitors may be used in dishwashing detergents of the invention. A cleaning product of the invention for hard surfaces may, furthermore, comprise abrasive constituents, 5 especially from the group consisting of quartz flours, wood flours, polymer flours, chalks and glass microbeads, and mixtures thereof. Abrasives are present in the detergents of the invention preferably at not more than 20% by weight, in particular from 5% by 10 weight to 15% by weight.

In order to adjust the pH to a desired level which does not come about of itself through the mixing of the other components, the compositions of the invention may 15 comprise system-compatible and environmentally compatible acids, especially citric acid, acetic acid, tartaric acid, malic acid, lactic acid, glycolic acid, succinic acid, glutaric acid and/or adipic acid, or else mineral acids, especially sulfuric acid, or bases, 20 especially ammonium hydroxides or alkali metal hydroxides. pH regulators of this kind are present in the compositions of the invention in amounts of preferably not more than 20% by weight, in particular from 1.2% by weight to 17% by weight.

25 The color transfer inhibitors suitable for use in laundry detergents of the invention include, in particular, polyvinylpyrrolidones, polyvinylimidazoles, polymeric N-oxides such as poly(vinylpyridine N-oxide), 30 and copolymers of vinylpyrrolidone with vinylimidazole.

Graying inhibitors have the function of keeping the soil detached from the textile fiber in suspension in the liquor. Suitable for this purpose are water soluble 35 colloids, usually organic in nature, examples being starch, glue, gelatin, salts of ether carboxylic acids or ether sulfonic acids of starch or of cellulose, or salts of acidic sulfuric esters of cellulose or of starch. Water soluble polyamides containing acidic

groups are also suitable for this purpose. Furthermore, starch derivatives other than those mentioned above may be used, aldehyde starches, for example. Preference is given to cellulose ethers, such as
5 carboxymethylcellulose (Na salt), methylcellulose, hydroxyalkylcellulose and mixed ethers, such as methylhydroxyethylcellulose, methylhydroxypropyl-cellulose, methylcarboxymethylcellulose, and mixtures thereof, in amounts, for example, of from 0.1 to 5% by
10 weight, based on the compositions.

As optical brighteners, laundry detergents of the invention may comprise derivatives of diaminostilbene-disulfonic acid and/or its alkali metal salts.
15 Suitable, for example, are salts of 4,4'-bis(2-anilino-4-morpholino-1,3,5-triazinyl-6-amino)stilbene-2,2'-disulfonic acid or compounds of similar structure which instead of the morpholino group carry a diethanolamino group, a methylamino group, an anilino group, or a
20 2-methoxyethylamino group. It is also possible for brighteners of the substituted diphenylstyryl type to be present, for example, the alkali metal salts of 4,4'-bis(2-sulfostyryl)biphenyl, 4,4'-bis(4-chloro-3-sulfostyryl)biphenyl, or 4-(4-chlorostyryl)-4'-(2-sulfostyryl)biphenyl. Mixtures of the aforementioned optical brighteners may also be used.
25

Especially for use in machine processes, it may be of advantage to add customary foam inhibitors to the
30 compositions. Examples of suitable foam inhibitors are soaps of natural or synthetic origin having a high C₁₈-C₂₄ fatty acid fraction. Examples of suitable nonsurfactant-type foam inhibitors are organopolysiloxanes and their mixtures with microfine,
35 optionally silanized silica and also paraffins, waxes, microcrystalline waxes, and mixtures thereof with silanized silica or bis-fatty acid alkylene diamides. With advantages, use is also made of mixtures of different foam inhibitors, for example, mixtures

comprising silicones, paraffins, or waxes. The foam inhibitors, especially those containing silicone and/or paraffin, are preferably bound on a granular, water soluble or dispersible support substance. Particular 5 preference is given to mixtures of paraffins and bisstearylethylenediamide.

The production of solid compositions of the invention presents no difficulties and may be done 10 conventionally, for example, by spray drying or granulation, with the enzymes and any other heat sensitive ingredients such as bleaches, for example, being added separately later on if desired. To produce compositions of the invention of heightened bulk 15 density, in particular in the range from 650 g/l to 950 g/l, preference is given to a process known from European Patent EP 0 486 592 which includes an extrusion step. Another preferred preparation, with the aid of a granulation process, is described in European 20 Patent EP 0 642 576.

To produce compositions of the invention in tablet form, which may have one or more phases, may have one or more colors, and consist in particular of one layer 25 or of two or more layers, in particular of two layers, it is preferred to follow a procedure in which all of the constituents - per one layer if appropriate - are mixed with one another in a mixer and the mixture is compressed by means of conventional tabletting presses, 30 for example, eccentric presses or rotary presses, at pressing forces in the range from about 50 to 100 kN, preferably from 60 to 70 kN. Especially in the case of multilayer tablets it may be of advantage if at least one layer is compressed beforehand. This is preferably 35 accomplished at pressing forces of between 5 and 20 kN, in particular from 10 to 15 kN. In this way, tablets which are fracture resistant and yet dissolve sufficiently quickly under application conditions are obtained without problems, having fracture strengths

and flexural strengths of normally from 100 to 200 N, but preferably above 150 N. A tablet produced in this way preferably has a weight of from 10 g to 50 g, in particular from 15 g to 40 g. The three-dimensional
5 form of the tablets is arbitrary and may be circular, oval or angular, with intermediate forms also being possible. Corners and edges are advantageously rounded. Circular tablets preferably have a diameter of from 30 mm to 40 mm. In particular, the size of tablets of
10 angular or cuboid design which are introduced predominantly by way of the dosing apparatus of, for example, the dishwashing machine is dependent on the geometry and on the volume of this dosing apparatus. Embodiments which are preferred by way of example have
15 a basal area of (from 20 to 30 mm) × (from 34 to 40 mm), in particular of 26×36 mm or of 24×38 mm.

Liquid or paste detergents of the invention in the form
of solutions comprising customary solvents are
20 generally prepared by simply mixing the ingredients, which may be introduced in bulk or in solution into an automatic mixer.

Examples

25

Example 1

A detergent (**VI**) for the machine washing of kitchen-
and tableware, comprising 55% by weight sodium
30 tripolyphosphate (calculated as anhydrous), 4% by weight amorphous sodium disilicate (calculated as anhydrous), 22% by weight sodium carbonate, 9% by weight sodium perborate, 2% by weight TAED, 2% by weight nonionic surfactant, and also 2% by weight
35 amylase granules (Termamyl® 60T) and 1.4% by weight protease granules (activity 200,000 PU/g) comprising the *Bacillus latus* protease (remainder to 100% by weight water, perfume and dye), a composition **V2**, whose composition was otherwise like that of **V1** but

additionally contained a quantity of a Co-containing active substance combination in accordance with EP 0 832 969 such that the Co content was 100 ppm, and also compositions in accordance with the invention (**M1** and **M2**, respectively), whose composition was otherwise like that of **V1** but which instead of Termamyl® contained protein-equal amounts of amylase from *Bacillus amyloliquefaciens* and, in addition, a quantity of a Co-containing active substance combination, according to EP 0 832 969 such that the Co content was 50 ppm or 100 ppm, respectively, were tested as indicated below:

In a Miele® G 575 dishwasher (additions of 20 g of each test composition in the universal program, water hardness 14-16°dH [German hardness], operating temperature 55°C), in each case 6 plates soiled with standardized starch stains or bleachable stains were washed and the remaining stain residue was determined gravimetrically and related to the initial value prior to washing (i.e., 100%). The table below indicates in each case the percentage of stain removed.

Table 1: Cleaning performance [% starch removal]

Composition	Cleaning performance
V1	57
V2	83
M1	98
M2	99

It can be seen that the compositions of the invention are significantly superior to the noninventive compositions in cleaning performance. Essentially the same results were obtained if the Co-containing active substance combination in the compositions of the invention was replaced by chloropentaamminecobalt(III)

chloride in amounts such that the Co concentration remained the same.

What is claimed is:

1. An amylase containing detergent, which comprises
5 α -amylase from *Bacillus amyloliquefaciens* and
bleach boosting transition metal complex compound
in addition to customary ingredients compatible
with such constituents.
- 10 2. The composition as claimed in claim 1, containing
amylase in amounts of from 0.001 mg to 0.5 mg, in
particular from 0.02 mg to 0.3 mg, per gram of the
overall composition.
- 15 3. The composition as claimed in claim 1 or 2,
wherein the bleach boosting transition metal
complex compound is selected from the complex
compounds of Mn, Fe, Co, Cu, Mo, V, Ti or Ru or
mixtures thereof.
- 20 4. The composition as claimed in any of claims 1 to
3, wherein the bleach boosting transition metal
complex compound is selected from the compounds of
the general formula I
$$[M(NH_3)_{6-x-2y}L_x(L^2)_y]A_n \quad (I)$$

25 where M is a transition metal selected from
cobalt, iron, copper and ruthenium, L is a ligand
attached by way of one coordination site and L^2 is
a ligand attached by way of two coordination
sites, x is a number from 0 to 5, y is a number
30 from 0 to 2, with the proviso that $x + 2y$ is not
more than 5, A is a salt-forming anion, and n is a
number of a size such that the compound of formula
(I) has no charge.
- 35 5. The composition as claimed in any of claims 1 to
3, wherein the bleach boosting transition metal
complex compound is an active substance
combination obtainable by intimately mixing a
water soluble salt of a divalent transition metal

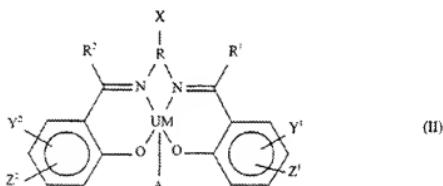
selected from cobalt, iron, copper and ruthenium and mixtures thereof, a water soluble ammonium salt and, if desired, a peroxygen-based oxidizing agent, and also inert carrier material.

5

6. The composition as claimed in any of claims 1 to 3, wherein the transition metal complex compound comprises at least one optionally N-alkylated triazacyclononane ligand.

10

7. The composition as claimed in any of claims 1 to 3, wherein the bleach boosting transition metal complex compound is selected from the compounds of the general formula (II)



15

where

UM is manganese, iron, cobalt, ruthenium or molybdenum,

20 R represents an alkylene, alkenylene, phenylene or cycloalkylene radical which may if desired be alkyl- and/or aryl-substituted, having a total of 1 to 12 carbon atoms, the shortest distance within R between the nitrogen atoms which complex with UM being 1 to 5 carbon atoms,

25 X represents -H, -OR³, -NO₂, -F, -Cl, -Br or -I,

30 R¹, R² and R³ independently of one another represent hydrogen or an alkyl radical having 1 to 4 carbon atoms,

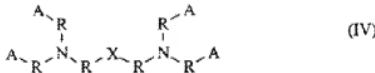
Y¹ and Y² independently of one another represent hydrogen or an electron displacing substituent, Y¹ and Y² not both being hydrogen if R is alkylene or cyclohexylene,
5 Z¹ and Z² independently of one another represent hydrogen, -CO₂M, -SO₃M or -NO₂,
M represents hydrogen or an alkali metal and
10 A represents a charge equalizing anion ligand.

8. The composition as claimed in any of claims 1 to
15 3, wherein the bleach boosting transition metal complex compound is selected from the complexes of the transition metals manganese, iron, cobalt, ruthenium, molybdenum, titanium, vanadium and/or copper which possess one or more of the ligands of the general formula III



20 where R is a direct bond or an optionally amino-substituted alkylene group having 1 to 4 carbon atoms, A represents a fused or unfused ring system containing at least one nitrogen atom, and B is
25 hydrogen, an OH group or A.

9. The composition as claimed in any of claims 1 to
30 3, wherein the bleach boosting transition metal complex compound is selected from the complexes of the transition metals manganese, iron, cobalt, ruthenium, molybdenum, titanium, vanadium and/or copper which possess one or more of the ligands of the general formula IV



where R is a direct bond or an optionally amino-substituted alkylene group having 1 to 4 carbon atoms, A represents a fused or unfused ring system containing at least one nitrogen atom, and B is hydrogen, an OH group or A.

5 10. The composition as claimed in any of claims 1 to 9, comprising the transition metal complex compound in an amount, based on transition metal, of up to 1% by weight, in particular from 0.001% by weight to 0.25% by weight.

15 11. The composition as claimed in any of claims 1 to 10, comprising up to 50% by weight, in particular from 5% by weight to 30% by weight, of peroxygen compound.

20 12. The composition as claimed in any of claims 1 to 11, comprising from 0.5% by weight to 10% by weight, in particular from 1% by weight to 8% by weight, of compound which gives off peroxy-carboxylic acid under perhydrolysis conditions.

25 13. The use of a combination of α -amylase from *Bacillus amyloliquefaciens* and transition metal complex compound for enhancing the cleaning performance of detergents when used in washing and cleaning solutions, especially aqueous washing and cleaning solutions, which comprise a peroxygen compound.

30 14. The use as claimed in claim 13, wherein the cleaning performance is enhanced in relation to starchy and/or colored stains, especially tea-based stains.

35

Replacement page 29

What is claimed is:

1. An amylase containing detergent, which comprises naturally occurring α -amylase from *Bacillus amyloliquefaciens* and bleach boosting transition metal complex compound in addition to customary ingredients compatible with such constituents.
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2. The composition as claimed in claim 1, containing amylase in amounts of from 0.001 mg to 0.5 mg, in particular from 0.02 mg to 0.3 mg, per gram of the overall composition.
10
3. The composition as claimed in claim 1 or 2, wherein the bleach boosting transition metal complex compound is selected from the complex compounds of Mn, Fe, Co, Cu, Mo, V, Ti or Ru or mixtures thereof.
15
- 20 4. The composition as claimed in any of claims 1 to 3, wherein the bleach boosting transition metal complex compound is selected from the compounds of the general formula I
$$[M(NH_3)_{6-x-2y}L_x(L^2)_y]A_n \quad (I)$$
where M is a transition metal selected from cobalt, iron, copper and ruthenium, L is a ligand attached by way of one coordination site and L^2 is a ligand attached by way of two coordination sites, x is a number from 0 to 5, y is a number from 0 to 2, with the proviso that $x + 2y$ is not more than 5, A is a salt-forming anion, and n is a number of a size such that the compound of formula (I) has no charge.
25
- 30 5. The composition as claimed in any of claims 1 to 3, wherein the bleach boosting transition metal complex compound is an active substance
35

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combination obtainable by intimately mixing a water soluble salt of a divalent transition metal selected from cobalt, iron, copper and ruthenium and mixtures thereof, a water soluble ammonium salt and, if desired, a peroxygen-based oxidizing agent, and also inert carrier material.

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R¹, R² and R³ independently of one another represent hydrogen or an alkyl radical having 1 to 4 carbon atoms,

5 Y¹ and Y² independently of one another represent hydrogen or an electron displacing substituent, Y¹ and Y² not both being hydrogen if R is alkylene or cyclohexylene,

10 Z¹ and Z² independently of one another represent hydrogen, -CO₂M, -SO₃M or -NO₂,

M represents hydrogen or an alkali metal and

A represents a charge equalizing anion ligand.

15

8. The composition as claimed in any of claims 1 to 3, wherein the bleach boosting transition metal complex compound is selected from the complexes of the transition metals manganese, iron, cobalt, 20 ruthenium, molybdenum, titanium, vanadium and/or copper which possess one or more of the ligands of the general formula III



25 where R is a direct bond or an optionally amino-substituted alkylene group having 1 to 4 carbon atoms, A represents a fused or unfused ring system containing at least one nitrogen atom, and B is hydrogen, an OH group or A.

30 9. The composition as claimed in any of claims 1 to 3, wherein the bleach boosting transition metal complex compound is selected from the complexes of

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the transition metals manganese, iron, cobalt, ruthenium, molybdenum, titanium, vanadium and/or copper which possess one or more of the ligands of the general formula IV



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where R is a direct bond or an optionally amino-substituted alkylene group having 1 to 4 carbon atoms, A represents a fused or unfused ring system containing at least one nitrogen atom, and X is an optionally hydroxyl- and/or C₁₋₄ alkyl-substituted phenylene ring or an optionally hydroxyl-substituted C₁₋₄ alkylene group.

- 10 10. The composition as claimed in any of claims 1 to comprising the transition metal complex compound in an amount, based on transition metal, of up to 1% by weight, in particular from 0.001% by weight to 0.25% by weight.
- 15 11. The composition as claimed in any of claims 1 to 10, comprising up to 50% by weight, in particular from 5% by weight to 30% by weight, of peroxygen compound.
- 20 12. The composition as claimed in any of claims 1 to 11, comprising from 0.5% by weight to 10% by weight, in particular from 1% by weight to 8% by weight, of compound which gives off peroxycarboxylic acid under perhydrolysis conditions.
- 25 13. The use of a combination of naturally occurring α -amylase from *Bacillus amyloliquefaciens* and transition metal complex compound for enhancing

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the cleaning performance of detergents when used in washing and cleaning solutions, especially aqueous washing and cleaning solutions, which comprise a peroxygen compound.

5

14. The use as claimed in claim 13, wherein the cleaning performance is enhanced in relation to starchy and/or colored stains, especially tea-based stains.